# SPRING SUPPORT FOR SEATING AREA OF FURNITURE

## FIELD OF THE INVENTION

**[0001]** The present invention relates to furniture and, more particularly, to seating areas of furniture.

## BACKGROUND OF THE INVENTION

**[0002]** Furniture designed to support an occupant positioned on the furniture typically includes a seating area that is configured to comfortably support the occupant. In an effort to provide comfortable support for the occupant, the seating area may include a spring support system upon which a resilient cushion is positioned. The spring support system typically includes a plurality of springs that are positioned throughout the seating area. These support springs are typically coil springs that are interconnected throughout the seating area to form the spring support system. The upper portions of the coil springs may be interconnected by a cord in what is known in the field as 8-way hand tying. The lower portions of the coil springs are typically interconnected through the use of webbing that extends across the bottom of the spring support system. The webbing extends between the framing members of the furniture in both a front to back orientation and a left to right or lateral orientation. The webbing is typically formed from fabric strips and/or metal bands. This type of webbing is expensive and labor intensive in construction. The labor intensive construction limits the throughput of the manufacturing operation producing

furniture with such a spring support system. The webbing is also subject to sagging which may result in an undesirable appearance and/or performance of the seating area of the piece of furniture. Additionally, the use of webbing may result in spring placement that is not consistent from one seating area to the next when producing the same piece of furniture.

**[0003]** Thus, it is advantageous to reduce the cost associated with providing a spring support system for a piece of furniture. Additionally, it is advantageous for such a reduced cost spring support system to be less labor intensive thereby enabling an increase in throughput of a manufacturing operation producing furniture with such a spring support system. It is also advantageous if such a spring support system is not subject to sagging and positions the springs in a desired location.

## SUMMARY OF THE INVENTION

**[0004]** The present invention provides a spring support system for a seating area of a piece of furniture. The spring support system, according to the principles of the present invention, is less labor intensive to manufacture and uses less costly materials. Additionally, the spring support system locates the spring in a desired position and is not subject to sagging.

**[0005]** A spring support system according the principles of the present invention includes at least one rigid support member having at least one notch therein. At least one spring is attached to the support member proximate the

notch. The spring is supported by the support member. A portion of the spring is compressed into the notch when the spring is compressed.

**[0006]** The present invention also discloses a piece of furniture having a spring support system according to the principles of the present invention. The piece of furniture includes a frame having a seating area and a spring support system in the seating area. The spring support system includes at least one rigid support member that is fixedly attached to the frame and extends across the seating area. There is at least one notch in the support member. At least one spring is attached to the support member proximate the notch. The spring is supported by the support member and a portion of the spring is compressed into the notch when the spring is compressed.

**[0007]** A method of manufacturing a piece of furniture having a spring support system according to the principles of the present invention is also disclosed. The method includes: (1) providing a frame for the piece of furniture, the frame having a seating area; (2) attaching a rigid support member having at least one notch to the frame with the support member extending across the seating area; and (3) attaching a spring to the support member proximate the notch.

**[0008]** Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0009]** The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

**[0010]** Figure 1 is a perspective view of a typical piece of furniture in which a spring support system according to the principles of the present invention can be employed;

**[0011]** Figure 2 is a perspective view of the frame of the piece of furniture of Figure 1 with a portion of a spring support system according to the principles of the present invention shown;

**[0012]** Figure 3 is an enlarged partial top plan view of a portion of the frame of Figure 2 showing a portion of a spring support system according to the principles of the present invention;

**[0013]** Figure 4 is a partial cross-sectional view of the spring support system of Figure 3 along line 4-4;

**[0014]** Figure 5 is an enlarged exploded view of a potion of the spring support system according to the principles of the present invention;

**[0015]** Figure 6 is an enlarged side elevation view of a portion of a the spring support system showing an alternate way to secure a coil spring to the support member; and

**[0016]** Figure 7 is an enlarged partial top plan view of a portion of the frame of Figure 2 showing a portion of an alternate embodiment of the spring support system according to the principles of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0017]** The following description of the preferred embodiment is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

**[0018]** The present invention is directed to a spring support system that is used in a seating area of a piece of furniture, such as the piece of furniture generally indicated as 20 in Figure 1, to provide a comfortable support for a user of the furniture. The furniture 20 includes a seating area 22 below which a spring support system according to the principles of the present invention is used. Seating area 22 may include a plurality of cushions 24 that include a resilient member, such as foam, which are positioned on top of the spring support system. The piece of furniture 20 may also include a back support area 26 which may also include a plurality of resilient cushions.

**[0019]** Referring now to Figure 2, the frame 30 for piece of furniture 20 is shown. Frame 30 includes a pair of side rails 32, 34, a front rail 36 and a rear rail 38. Front and rear rails 36, 38 extend laterally between side rails 32, 34. A portion of a spring support system according to the principles of the present invention is generally indicated as 40. Spring support system 40 extends between rails 32, 34, 36 and 38 and forms the seating area portion of frame 30.

**[0020]** Referring now to Figures 3, 4 and 5, spring support system 40 includes a plurality of support members 42 that are fixedly attached to and extend between front and rear rails 36, 38. Spring support system 40 also

includes noise abatement layers 44, coil springs 46 and cords 48. The support members provide support for coil springs 46. The upper portions of coil springs 46 are interconnected by cords 48. Specifically, cords 48 are tied to the upper portions of coil springs 46 in what is known in the art as 8-way hand tying. Cords 48 are also secured to rails 32, 34, 36, 38. Cords 48 are preferably a form of upholstery twine although other types of cords can be used. The 8-way hand tying of the upper portions of coil springs 46 together maintains the orientation of these springs and their relative positions when piece of furniture 20 is being used. The lower portions of coil springs 46 are secured to support members 42, as discussed below. Noise abatement layers 44 are positioned between coil springs 46 and support members 42 to reduce noise that may occur during compression and decompression of coil springs 46.

**[0021]** Support members 42 are operable to position and support coil springs 46. Specifically, each support member 42 includes a plurality of notches 50 that are positioned at desired locations and around which a coil spring 46 is secured. Accordingly, the locations of notches 50 will vary depending upon the design of the piece of furniture 20. Coil springs 46 are compressed into an associated notch 50 when piece of furniture 20 is being used to support an occupant. The dimensions of notches 50 will also vary depending upon the dimensions and configurations of the coil springs. There are holes 52 on opposite sides of each notch 50 which are used to secure coil springs 46 to support members 42 above each notch 50. Each hole 52 is sized to allow the lowermost convolution of each coil spring 46 to be inserted through hole 52.

Specifically, the end of coil spring 46 on the lowermost convolution is inserted through a first hole 52 on one side of notch 50 until it extends out the other side and is then inserted through a second hole 52 on an opposite side of the same notch 50 so that the lowermost convolution of each coil spring 46 passes through an entirety of both holes 52 on each side of notch 50. Once the lowermost convolution is inserted through both holes 52, coil spring 46 becomes difficult to remove and is secured to support member 42. Optionally, the end of the lowermost convolution can be restrained, such as by bending, to further inhibit coil spring 46 from being removed from the hole. The coil springs can be inserted into holes 52 in a variety of motions. For example, the insertion of the lowermost convolution of coil springs 46 can be accomplished by twisting of the coil spring while threading the lowermost convolution through holes 52. If desired, the lowermost convolution of each coil spring 46 can extend through only a portion of the second hole 52 if such arrangement adequately inhibits removal of coil spring 46 from support member 42. Once coil springs 46 are secured to support members 42 the top portions of coil springs 46 can be tied together.

**[0022]** Holes 52 are preferably circular, however, it should be appreciated that holes 52 can take other shapes. Holes 52 are preferably dimensioned to be slightly larger than the cross sectional diameter of the wire of coil springs 46. By being slightly larger than the cross sectional diameter of the wire of coil springs 46, coil springs 46 are easily inserted through holes 52 and secured to support member 42. Alternatively, holes 52 can be dimensioned to

provide a tight or interference type fit. The secure connection between support members 42 and coil springs 46 maintains coil springs 46 in their desired location during the 8-way hand tying of the upper portions of coil springs 46 together with cords 48.

**[0023]** Alternatively, as shown in Figure 6, grooves 54 can be used in place of holes 52. That is, grooves 54 can be formed on either side of each notch 50. Grooves 54 are dimensioned to have a width slightly larger than the cross sectional diameter of the wire of coil springs 46. Coil springs 46 can then be attached to support member 42 by securing the lowermost convolution of each coil spring 46 in grooves 54 on the opposite sides of notch 50. The lowermost convolution can be secured in grooves 54 by a twisting motion similar to that used for threading through holes 52 or by compressing the lowermost convolution into grooves 54. The coil springs are then secured to support member 42 and can be tied together with cords 48.

**[0024]** Each support member 42 is attached to and extends between front and rear rails 36, 38. Support members 42 can be attached to front and rear rails 36, 38 in a variety of ways. For example, support members 42 and front and rear rails 36, 38 can be attached together using a mortise and tenon joint. Adhesives and staples are used in the mortise and tenon joint to secure support members 42 to front and rear rails 36, 38. The secure attachment of each support member 42 to front and rear rails 36, 38 provides a rigid support for each coil spring 46 that does not sag during use. Additionally, support members 42 also prevent front and rear rails 36, 38 from bowing.

**[0025]** Support members 42 are rigid and can be made from a variety of materials. For example, support members 42 can be made from a hard wood, such as oak, ash, poplar and birch, a soft wood, such a pine or fir, an engineered wood, and a plastic, such as an engineering grade polymer.

**[0026]** Noise abatement layers 44 are positioned between support members 42 and coil springs 46. Specifically, each noise abatement layer 44 is positioned along a top surface of a support member 42 and extends into notches 50 on support member 42. Noise abatement layer 44 prevents direct contact between coil springs 46 and notch 50. Noise abatement layer 44 can be secured in position on support member 42 in a variety of ways. For example, noise abatement layer 44 can be secured with an adhesive, staples or similar means. Noise abatement layer 44 extends along a majority of the top surface of support member 42 following the contour thereof including the contours of notches 50. Alternatively, noise abatement layer 44 can be a plurality of discrete strips that are secured to each notch 50 and cover portions of the top surface of support members 42 proximate to the notch. With noise abatement layer 44 secured to support member 42, noise abatement layer 44 can operate to reduce and/or eliminate the noise associated with coil springs 46 compressing into notches 50. Specifically, when a coil spring 46 is compressed and noise abatement layer 44 is not present, portions of coil spring 46 may contact the corner/edge of notch 50 and/or side walls of notch 50 during the compression or decompression and thereby produce a "popping" or similar type of noise. Noise abatement layers 44 are designed to minimize the "popping" sound or noise associated with the

compression and decompression of coil springs 46 into notches 50 by preventing direct contact between coil springs 46 and both the side walls of notches 50 and the top surface of support members 42.

**[0027]** Noise abatement layer 44 can be made from a variety of materials. For example, noise abatement layer 44 can be made from cotton, a Dacron® fiber, polyurethane foam, and a double layer of fabric. The use of a double layer of fabric is advantageous in that the fabric can be scrap material that is readily available from the production of other pieces of furniture. It should be appreciated that materials other than those disclosed can be used for noise abatement layer 44.

**[0028]** Referring now to Figure 7, a portion of an alternate embodiment of spring support system, generally indicated as 40', is shown. Spring support system 40' is substantially the same as spring support system 40 with the exception of the orientation of the support members. Specifically, in spring support system 40', support members 42' are fixedly attached to and extend laterally between side rails 32, 34. Support members 42' are attached to side rails 32, 34 in the same manner as that discussed above with reference to spring support system 40. With support members 42' extending laterally, support members 42' do not prevent or assist in preventing the bowing of front and rear rails 36, 38. To compensate, optional bracing members 60 can be added to frame 30' below support members 42'. Bracing members 60 are fixedly secured to and extend between front and rear rails 36, 38 and thereby minimize and/or prevent bowing of front and rear rails 36, 38.

**[0029]** While the present invention has been described with reference to specific embodiments and examples, it should be appreciated that variations or deviations therefrom are also within the scope of the invention. For example, the seating area 22 of piece of furniture 20 can take various shapes other than the rectangular shape shown. For example, the seating area can be circular, triangular, oval, etc. Additionally, it should be appreciated that the spring support system can be used with other types of furniture having seating areas. For example, the spring support system of the present invention can be used on a sofa, chair, love seat, ottoman, and the like. Furthermore, while the support members 42, 42' are shown and disclosed as extending between the rails either orthogonally to the front and rear rails or orthogonally to the side rails, the support members can extend diagonally between the rails and still be within the scope of the present invention. Moreover, while notches 50 are shown as having side walls that are orthogonal to the bottom surface of the notch, it should be appreciated that the side walls can taper outwardly as they extend from the bottom of the notch toward the top of the support member. The tapering of the side walls of the notches minimizes the potential for the coil springs to contact the tapered side walls during compression and/or decompression and thereby minimize the potential for creating noise. This tapering may be sufficient to eliminate the need for noise abatement layers 44. Thus, the description of the invention is merely exemplary in nature and variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such

variations are not to be regarded as a departure from the spirit and scope of the invention.